

PATENT ABSTRACTS OF JAPAN

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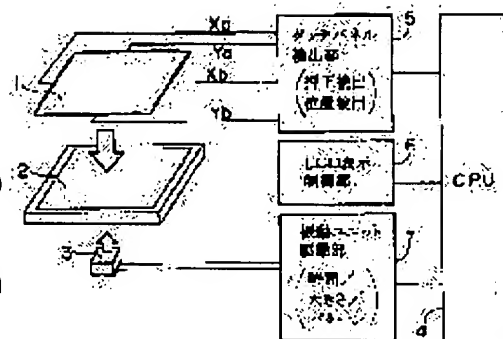
(22)Date of filing : 30.10.1998 (72)Inventor : KUMAGAI YASUHIRO

(54) TOUCH PANEL TYPE INPUT DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a touch panel type input device capable of confirming key touch by oscillation and to provide a user inter-face except for display screen and sound in a portable game machine having a touch panel.

SOLUTION: The touch panel type input device is provided with a liquid crystal display unit(LCD) 2, an LCD display control part 6 for controlling the display of characters or graphics on the LCD 2, a transparent touch panel 1 arranged on the upper part of the LCD 2 and capable of reading out the display contents of the LCD 2 from the upper part, a touch panel detection part 5 capable of detecting the depression of the panel 1 and its detecting position when prescribed depressing operation to the panel 1 executed, an oscillation unit 3 for generating oscillation in accordance with an instruction from the detection part 5 and transmitting the oscillation to a user's finger tip, an oscillation unit driving part 7 for controlling the drive of the unit 3, and a CPU 4 for controlling the detection part 5, the control part 6 and the driving part 7.



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TECHNICAL FIELD

[Field of the Invention] This invention relates to the function in which the input unit itself generates vibration especially by alter operation, about the touch-sensitive input unit equipped with the liquid crystal display.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] If a touch panel is touched and alter operation is conventionally performed in FA facility used at OA equipments, such as ATM (cash automatic payment deposit equipment) equipped with the liquid crystal display with a touch panel, and facsimile, and works, that out of which a key touch sound called PITSU for making it check that the user has keyed comes is put in practical use. Although there is also the approach of changing the contents of a display of a liquid crystal display screen by key input as a means to make a key input check, the means of which it complains to the acoustic sense of a key touch sound intuitively is effective.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the configuration of the touch-sensitive input unit by 1 operation gestalt of this invention.

[Drawing 2] It is drawing showing the structure of the oscillating unit of the operation gestalt of drawing 1.

[Drawing 3] It is the sectional view of the operation gestalt of drawing 1.

[Drawing 4] It is drawing showing the example of the display screen of the 1st application by the input unit of 1 operation gestalt of this invention.

[Drawing 5] It is drawing showing the example of the display screen of the 2nd application by the input unit of 1 operation gestalt of this invention.

[Drawing 6] It is drawing showing the example of the display screen of the 3rd application by the input unit of 1 operation gestalt of this invention.

[Description of Notations]

- 1 -- Touch panel
- 2 -- Liquid crystal display unit (LCD)
- 3 -- Oscillating unit
- 4 -- Central processing unit (CPU)
- 5 -- Touch panel detecting element
- 6 -- LCD display-control section
- 7 -- Oscillating unit mechanical component
- 8 -- Frame
- 9 -- Spring
- 10 -- Panel
- 21 -- Motor
- 22 -- Revolving shaft
- 23 -- Spindle
- 24 -- Attaching screw hole
- 25 -- Lead wire

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, by the approach of checking a key input with an above-mentioned key touch sound, it was hard to catch a key touch sound with the surrounding noise, and the technical problem that it became the offense of actuation occurred. Moreover, in the portable telephone without a touch panel, although what the shaker for an arrival-of-the-mail display (vibrator) which a cellular phone has at the time of depressions, such as a ten key, is vibrated, and tells an operator vibration was carried by JP,10-13507,A, what generates vibration by the input did not exist in the touch-sensitive input unit.

[0004] Moreover, in the home video game machine etc., although what vibrates the controller for game actuation connected by the cable from the body is already commercialized, in the portable game machine, the thing equipped with the liquid crystal display with a touch panel did not exist, but actuation is based on a manual operation button, a cross-joint carbon button, etc. which became independent chiefly. Since the interest of a game was increased, implementation of the function in which operate it by the touch panel also in a portable game machine, and the game machine itself vibrates by the touch panel input had become a technical problem.

[0005] This invention was made under such a background, and tell a user about whether it is an input service area with this input check means, or, in addition to offering the input check means of the touch panel which generates vibration by the key touch, it aims at providing improvement in user interfaces, such as a check of the actuation activation of elimination of data etc. for which their steps cannot be retraced, and the touch-sensitive input unit of the new actuation feeling at the time of using for a game machine etc.

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained until now, the 1st effectiveness by this invention is that a user can check a key touch also in the environment where it is hard to catch a key touch sound. The reason is because a touch panel front face vibrates at the time of a key touch and this can check a key touch in propagation somesthesia on a user's finger.

[0034] The 2nd effectiveness is that a user can check a key touch also in the hearing-impaired person who cannot catch a key touch sound. The reason is because a touch panel front face vibrates at the time of a key touch and this can check a key touch in propagation somesthesia on a user's finger.

[0035] The 3rd effectiveness is being able to perform use in the purpose which emits warning by the field which carried out the key touch. The reason is because oscillating patterns (magnitude of vibration, time amount, etc.) are alternatively changeable from detection of a touch location, and the comparison of the contents of a display.

[0036] The 4th effectiveness is increased from the case the interest of a game being based only on the contents of a display and the sound of a screen, when it applies to game devices, such as a portable game machine. The reason is because an effective oscillating pattern can be used with a touch location according to the contents of the game.

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MEANS

[Means for Solving the Problem] The LCD display-control section in which invention according to claim 1 performs the display control of the alphabetic character in which it is displayed on this LCD as a liquid crystal display unit (LCD), or a graphic form, The transparent touch panel which is arranged in the upper part of said LCD and can read the contents of a display of said LCD in the upper part, The touch panel detecting element which performs depression detection and depression location detection when predetermined depression actuation is performed on this touch panel, The oscillating unit which generates vibration and tells this vibration to a fingertip with directions of said touch panel detecting element, CPU which performs control of the oscillating unit control section which performs drive control of this oscillating unit, said touch panel detecting element and said LCD display-control section, and said oscillating unit mechanical component, and the touch-sensitive input unit which it comes to provide are offered.

[0007] The touch-sensitive input unit according to claim 1 characterized by supposing that a setup to the time amount on which the time amount in which said oscillating unit generates vibration is pushing said touch panel, or the arbitration time amount set up beforehand is possible for invention according to claim 2 is offered.

[0008] The touch-sensitive input unit according to claim 1 or 2 with which invention according to claim 3 is characterized by said oscillating unit control section enabling a setup of vibration periods, the magnitude of vibration, or an oscillating pattern at arbitration corresponding to the depression situation of said touch panel is offered.

[0009] Moreover, invention according to claim 4 offers the touch-sensitive input unit according to claim 1 to 3 characterized by enabling a setup of the existence of oscillating generating, the time amount of vibration, or the pattern of vibration to arbitration by whether said oscillating unit control section carries out the depression of the touch panel of which field of a display screen according to the contents of a display of said LCD.

[0010] In order to solve the technical problem mentioned above, while equipping the inferior surface of tongue with a liquid crystal display, with the touch-sensitive input unit of this invention, it has an oscillating unit for oscillating generating. The magnitude of vibration of an oscillating unit and the pattern of vibration are interlocked with the time amount which could set up beforehand and pushed the touch panel, and can also be set up. Moreover, the existence of oscillating generating, the time amount of vibration, and the pattern of vibration can be set as arbitration by whether the depression of the touch panel on which field of a display screen is carried out according to the contents of a display which the liquid crystal display under a touch panel shows.

[0011]

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained to a detail with reference to a drawing. Drawing 1 is drawing showing the configuration of the touch-sensitive input unit by 1 operation gestalt of this invention. Drawing 1 explains a component. A sign 1 may be a touch panel, and although a resistance film type analog touch panel is used here, the method of a touch panel itself may be anything. The thing of a digital type may be used.

[0012] 2 is a liquid crystal display unit (LCD), and can read the contents of a display of this LCD2 in the upper part through said transparent touch panel 1. 3 is an oscillating unit and the structure is mentioned later. 5 is a touch panel detecting element and performs depression detection of a touch panel, and depression location detection. 6 is the LCD display-control section and performs the display control of the alphabetic character displayed on said LCD2, and a graphic form. 7 is an oscillating unit mechanical component and performs drive control of said oscillating unit 3. Vibration periods, the magnitude of vibration, and an oscillating pattern are controlled.

[0013] 4 is a central processing unit (CPU) and performs whole control which combined other parts of equipment in which said touch panel detecting element 5, said LCD display-control section 6, said oscillating unit mechanical component 7, and this input unit that is not illustrated were carried. Although it dissociates for explanation and is drawn in drawing 1, as drawing 3 shows in fact, on both sides of LCD2, a touch panel 1, LCD2, and the oscillating unit 3 are stuck mutually, and are constituted.

[0014] Drawing 2 is drawing showing the structure of the oscillating unit used for this invention. The component in this drawing is explained. A sign 21 is lead wire for a motor, the spindle which carried out the configuration with 22 [unsymmetrical / the revolving shaft of a motor and 23 / on a shaft], and 24 to supply an attaching screw hole to a motor 21, and for 25 supply a drive current. If a motor 21 is rotated, since it is unsymmetrical, a spindle 23 will be generated by vibration to a revolving shaft 22. The magnitude of vibration will also become large if a drive current is enlarged.

[0015] Drawing 3 is the sectional view of 1 operation gestalt of this invention. The component in drawing 3 is explained. The touch panel which the sign 1 mentioned above, LCD in which 2 mentioned above, and 3 are the oscillating units mentioned above. A sign 8 is a frame for supporting the input unit of this operation gestalt. This frame does not need to be a metal. 9 is a spring and is used for the inferior-surface-of-tongue four corners of LCD2 four in all with this operation gestalt. This spring is required in order to vibrate only the part of an input unit independently of the equipment carrying this input unit. However, since the body of a game machine may vibrate in addition to the touch panel side of an input device when it applies to a portable game machine, this spring is omissible. A sign 10 is the makeup version.

[0016] Next, actuation of the 1st application of 1 operation gestalt of this invention is explained to a detail with reference to drawing. What was shown in drawing 4 is the example of the screen displayed on the input unit of this invention. This screen is demanding the input of a personal identification number of a user. It pushes on this screen and only the inside of the square field where the figure of 1, 2, ..., 0 on a screen was displayed is effective.

[0017] In drawing 1, if a user pushes the front face of a touch panel 1, the touch panel detecting element 5 will detect the location on that the touch panel had a depression input and the pushed touch panel (location on X and Y coordinate). About the detection approach, explanation is omitted for a known technique. The touch panel detecting element 5 tells the information detected to the central processing unit (CPU) 4. CPU4 compares the location (the location on X and Y coordinate and this are equal to the location on a touch panel 1) of the alphabetic character and graphic form which CPU4 shows to LCD2 through the LCD display-control section 6, and the location notified from the touch panel detecting element 5. As a result of comparing, directions will be emitted [vibrating the oscillating unit 3 to the oscillating unit mechanical component 7, and] if the location on the pushed touch panel 1 is in the square field where said figure of 1, 2, ..., 0 was displayed.

[0018] short, when an effective field is pushed -- directions are issued so that time amount (for example, for 0.5 seconds) vibration may be carried out. If the oscillating unit 3 which passes the drive current between 0.5 seconds to the oscillating unit 3 has structure shown in drawing 2 and the oscillating unit mechanical component 7 supplies a drive current from lead wire 25 in drawing 2, the revolving shaft 22 of a motor 21 will rotate. To a revolving shaft 22, since it is unsymmetrical, a spindle 23 is generated by vibration. Since it is firmly fixed to the inferior surface of tongue of LCD2 of drawing 1 with the screw using the attaching screw hole, vibration lets LCD2 pass and a motor 21 gets across to the front face of a touch panel 1. Since the front face of a touch panel 1 is touched with a user's finger, it can know that this vibration pushed propagation on a user's finger, and the user pushed the right field.

[0019] In addition, as shown in drawing 3, the input device of this invention is supported with the spring 9. This spring is required in order to vibrate only the part of an input unit independently of the equipment carrying this input unit. When there is no location on the pushed touch panel 1 into the square field where said figure of 1, 2, ..., 0 was displayed, since it is an invalid field, CPU4 does not emit directions of vibration to the oscillating unit mechanical component 7. Since a user does not have the pushed reaction, he can know that it is an invalid field.

[0020] Next, actuation of the 2nd application is explained to a detail with reference to drawing. What was shown in drawing 5 is the example of the screen displayed on the input unit of this invention. It is being required that this screen should choose one of three sorts of processings, preservation of data, elimination of data, and elimination of all data, as a user. It pushes on this screen and only the inside of three fields of an oblong rectangle where the figure and directive of 1, 2, and 3** were displayed is effective.

[0021] "-- 1. -- this data is saved -- " -- short [in an oscillating unit] by the completely same approach as the 1st application, when the inside of a rectangle region is pushed -- time amount (for example, for 0.5 seconds) vibration is carried out.

[0022] "-- 2. -- this data is eliminated -- " -- when a rectangle region is pushed, since it cannot restore, the data eliminated once vibrate a somewhat long time amount (for example, for 2 seconds) oscillating unit in order to warn. CPU4 of drawing 1 emits directions of vibration for 2 seconds to the oscillating unit mechanical component 7. After this vibration, although not illustrated, a screen is changed through the LCD display-control section 6, and [data are eliminated. Is it all right? "-- yes -- " -- "-- no -- " --] -- ** -- saying -- the contents -- displaying -- making .

[0023] "-- 3. -- all data are eliminated -- " -- since when the inside of a rectangle region is pushed gives a user warning in order that a user may suffer serious damage if all data are eliminated accidentally, CPU4 of drawing 1 emits the oscillating directions by bigger vibration than before to the oscillating unit mechanical component 7. Although not illustrated, a screen is changed and all [data are eliminated. Is it all right although it becomes impossible to continue actuation of a system? "-- yes -- " -- "-- no -- " --] -- ** -- saying -- the contents -- displaying -- making . Next, a user continues vibration until he does the depression of "yes" or no ["no"].

[0024] The oscillating unit mechanical component 7 can generate a bigger vibration by passing a big drive current by the oscillating unit 3. Vibration is not generated when it pushes except the three above-mentioned fields of an oblong rectangle.

[0025] Next, actuation of the 3rd application is explained to a detail with reference to drawing. It is the example of the display screen at the time of applying the input unit of this invention to a portable game machine which was shown in drawing 6. The mission to which a user (player) destroys enemy troops' fort by the missile is in negative on this screen. 1, 2, 3, 4, 5, and 6 are enemy troops' forts in drawing 6. Although a nuclear weapon, conventional arms, or food is hidden in the fort, there is also a camouflage fort without contents only in a form.

[0026] A player must destroy enemy troops' fort quickly in the game screen which changes every moment. An attack is delivered by touching the touch panel on a screen by the fingertip. When the fort in which conventional arms are hidden is touched, it is made to vibrate 3 times with BURUTSU, BURUTSU, and BURUTSU in the magnitude of vibration of whenever [middle], and a player is told about an offensive result. the case where the fort in which nuclear weapons are hidden is touched -- a brubru brubru bull, bull RURUNTSU !, and the beginning -- small -- the last -- it is made to vibrate greatly and big success in battle is told.

[0027] When what was touched is a provision store, vibration of the magnitude of whenever [middle] is short considered as BURURURU. When what was touched is a camouflage fort, it is made to vibrate as small [it is very short and] as BURUTSU. It is not made to vibrate when places other than a fort are touched. Thus, in this example, the amount of body sensory information to a change ***** player is increased for the oscillating pattern. Change of a pattern carries out, and as explained until now, time amount, the magnitude of vibration, intermittence of vibration, and continuous change of the magnitude of vibration are used for a way. The magnitude of vibration is controllable by the magnitude of the

current supplied to an oscillating unit.

[0028] Since that vibration gets across to the whole game machine will raise the interest of a game rather when this invention is applied to a portable game machine, the supporting structure of an input unit with the spring shown in drawing 3 is not taken.

[0029] If the above is summarized, when a user does the depression of the touch panel, a touch panel will detect this and an oscillating unit will be vibrated. Vibration of an oscillating unit vibrates the whole input unit, and the vibration gets across to a user's finger. A user can know the reaction of an input in somesthesia, when vibration has got across to its finger. If the depression of the touch panel is carried out, only fixed time amount can also be vibrated, and only the pushed time amount can also be vibrated.

[0030] Moreover, if it can also be set as the magnitude which is extent which can set up the magnitude of vibration beforehand and vibration understands, it is also possible to set it as such a big vibration that a user surprised. While pushing, it is also possible to set up gradually so that the magnitude of vibration may be changed by the step of actuation if vibration can also be enlarged.

[0031] Moreover, when the mistaken carbon button is pushed, a setup is possible [when the contents of a display which the liquid crystal display under a touch panel shows are the icons of a manual operation button etc. and a right carbon button is pushed in a current actuation step, it is made to vibrate short, and] so that it may be made to vibrate for a long time. By long vibration, an operator can know an operation mistake. In a right input of a key touch sound, this is short, in a post-input, is the analogy of a *****, and is an actuation interface intelligible for a user. When it is on a touch panel about actuation of hitting a partner when it applies to a game machine, it can make generating a big vibration etc. so that the interest of a game may be increased.

[0032] As mentioned above, although actuation of 1 operation gestalt of this invention has been explained in full detail with reference to a drawing, this invention is not restricted to this operation gestalt, and even if the design change of the range which does not deviate from the summary of this invention etc. occurs, it is contained in this invention.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the function in which the input unit itself generates vibration especially by alter operation, about the touch-sensitive input unit equipped with the liquid crystal display.

[0002]

[Description of the Prior Art] If a touch panel is touched and alter operation is conventionally performed in FA facility used at OA equipments, such as ATM (cash automatic payment deposit equipment) equipped with the liquid crystal display with a touch panel, and facsimile, and works, that out of which a key touch sound called PITSU for making it check that the user has keyed comes is put in practical use. Although there is also the approach of changing the contents of a display of a liquid crystal display screen by key input as a means to make a key input check, the means of which it complains to the acoustic sense of a key touch sound intuitively is effective.

[0003]

[Problem(s) to be Solved by the Invention] However, by the approach of checking a key input with an above-mentioned key touch sound, it was hard to catch a key touch sound with the surrounding noise, and the technical problem that it became the offense of actuation occurred. Moreover, in the portable telephone without a touch panel, although what the shaker for an arrival-of-the-mail display (vibrator) which a cellular phone has at the time of depressions, such as a ten key, is vibrated, and tells an operator vibration was carried by JP,10-13507,A, what generates vibration by the input did not exist in the touch-sensitive input unit.

[0004] Moreover, in the home video game machine etc., although what vibrates the controller for game actuation connected by the cable from the body is already commercialized, in the portable game machine, the thing equipped with the liquid crystal display with a touch panel did not exist, but actuation is based on a manual operation button, a cross-joint carbon button, etc. which became independent chiefly. Since the interest of a game was increased, implementation of the function in which operate it by the touch panel also in a portable game machine, and the game machine itself vibrates by the touch panel input had become a technical problem.

[0005] This invention was made under such a background, and tell a user about whether it is an input service area with this input check means, or, in addition to offering the input check means of the touch panel which generates vibration by the key touch, it aims at providing improvement in user interfaces, such as a check of the actuation activation of elimination of data etc. for which their steps cannot be retraced, and the touch-sensitive input unit of the new actuation feeling at the time of using for a game machine etc.

[0006]

[Means for Solving the Problem] The LCD display-control section in which invention according to claim 1 performs the display control of the alphabetic character in which it is displayed on this LCD as a liquid crystal display unit (LCD), or a graphic form, The transparent touch panel which is arranged in

the upper part of said LCD and can read the contents of a display of said LCD in the upper part, The touch panel detecting element which performs depression detection and depression location detection when predetermined depression actuation is performed on this touch panel, The oscillating unit which generates vibration and tells this vibration to a fingertip with directions of said touch panel detecting element, CPU which performs control of the oscillating unit control section which performs drive control of this oscillating unit, said touch panel detecting element and said LCD display-control section, and said oscillating unit mechanical component, and the touch-sensitive input unit which it comes to provide are offered.

[0007] The touch-sensitive input unit according to claim 1 characterized by supposing that a setup to the time amount on which the time amount in which said oscillating unit generates vibration is pushing said touch panel, or the arbitration time amount set up beforehand is possible for invention according to claim 2 is offered.

[0008] The touch-sensitive input unit according to claim 1 or 2 with which invention according to claim 3 is characterized by said oscillating unit control section enabling a setup of vibration periods, the magnitude of vibration, or an oscillating pattern at arbitration corresponding to the depression situation of said touch panel is offered.

[0009] Moreover, invention according to claim 4 offers the touch-sensitive input unit according to claim 1 to 3 characterized by enabling a setup of the existence of oscillating generating, the time amount of vibration, or the pattern of vibration to arbitration by whether said oscillating unit control section carries out the depression of the touch panel of which field of a display screen according to the contents of a display of said LCD.

[0010] In order to solve the technical problem mentioned above, while equipping the inferior surface of tongue with a liquid crystal display, with the touch-sensitive input unit of this invention, it has an oscillating unit for oscillating generating. The magnitude of vibration of an oscillating unit and the pattern of vibration are interlocked with the time amount which could set up beforehand and pushed the touch panel, and can also be set up. Moreover, the existence of oscillating generating, the time amount of vibration, and the pattern of vibration can be set as arbitration by whether the depression of the touch panel on which field of a display screen is carried out according to the contents of a display which the liquid crystal display under a touch panel shows.

[0011]

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained to a detail with reference to a drawing. Drawing 1 is drawing showing the configuration of the touch-sensitive input unit by 1 operation gestalt of this invention. Drawing 1 explains a component. A sign 1 may be a touch panel, and although a resistance film type analog touch panel is used here, the method of a touch panel itself may be anything. The thing of a digital type may be used.

[0012] 2 is a liquid crystal display unit (LCD), and can read the contents of a display of this LCD2 in the upper part through said transparent touch panel 1. 3 is an oscillating unit and the structure is mentioned later. 5 is a touch panel detecting element and performs depression detection of a touch panel, and depression location detection. 6 is the LCD display-control section and performs the display control of the alphabetic character displayed on said LCD2, and a graphic form. 7 is an oscillating unit mechanical component and performs drive control of said oscillating unit 3. Vibration periods, the magnitude of vibration, and an oscillating pattern are controlled.

[0013] 4 is a central processing unit (CPU) and performs whole control which combined other parts of equipment in which said touch panel detecting element 5, said LCD display-control section 6, said oscillating unit mechanical component 7, and this input unit that is not illustrated were carried. Although it dissociates for explanation and is drawn in drawing 1, as drawing 3 shows in fact, on both sides of LCD2, a touch panel 1, LCD2, and the oscillating unit 3 are stuck mutually, and are constituted.

[0014] Drawing 2 is drawing showing the structure of the oscillating unit used for this invention. The component in this drawing is explained. A sign 21 is lead wire for a motor, the spindle which carried out the configuration with 22 [unsymmetrical / the revolving shaft of a motor and 23 / on a shaft], and 24 to supply an attaching screw hole to a motor 21, and for 25 supply a drive current. If a motor 21 is

rotated, since it is unsymmetrical, a spindle 23 will be generated by vibration to a revolving shaft 22. The magnitude of vibration will also become large if a drive current is enlarged.

[0015] Drawing 3 is the sectional view of 1 operation gestalt of this invention. The component in drawing 3 is explained. The touch panel which the sign 1 mentioned above, LCD in which 2 mentioned above, and 3 are the oscillating units mentioned above. A sign 8 is a frame for supporting the input unit of this operation gestalt. This frame does not need to be a metal. 9 is a spring and is used for the inferior-surface-of-tongue four corners of LCD2 four in all with this operation gestalt. This spring is required in order to vibrate only the part of an input unit independently of the equipment carrying this input unit. However, since the body of a game machine may vibrate in addition to the touch panel side of an input device when it applies to a portable game machine, this spring is omissible. A sign 10 is the makeup version.

[0016] Next, actuation of the 1st application of 1 operation gestalt of this invention is explained to a detail with reference to drawing. What was shown in drawing 4 is the example of the screen displayed on the input unit of this invention. This screen is demanding the input of a personal identification number of a user. It pushes on this screen and only the inside of the square field where the figure of 1, 2, ..., 0 on a screen was displayed is effective.

[0017] In drawing 1, if a user pushes the front face of a touch panel 1, the touch panel detecting element 5 will detect the location on that the touch panel had a depression input and the pushed touch panel (location on X and Y coordinate). About the detection approach, explanation is omitted for a known technique. The touch panel detecting element 5 tells the information detected to the central processing unit (CPU) 4. CPU4 compares the location (the location on X and Y coordinate and this are equal to the location on a touch panel 1) of the alphabetic character and graphic form which CPU4 shows to LCD2 through the LCD display-control section 6, and the location notified from the touch panel detecting element 5. As a result of comparing, directions will be emitted [vibrating the oscillating unit 3 to the oscillating unit mechanical component 7, and] if the location on the pushed touch panel 1 is in the square field where said figure of 1, 2, ..., 0 was displayed.

[0018] short, when an effective field is pushed -- directions are issued so that time amount (for example, for 0.5 seconds) vibration may be carried out. If the oscillating unit 3 which passes the drive current between 0.5 seconds to the oscillating unit 3 has structure shown in drawing 2 and the oscillating unit mechanical component 7 supplies a drive current from lead wire 25 in drawing 2, the revolving shaft 22 of a motor 21 will rotate. To a revolving shaft 22, since it is unsymmetrical, a spindle 23 is generated by vibration. Since it is firmly fixed to the inferior surface of tongue of LCD2 of drawing 1 with the screw using the attaching screw hole, vibration lets LCD2 pass and a motor 21 gets across to the front face of a touch panel 1. Since the front face of a touch panel 1 is touched with a user's finger, it can know that this vibration pushed propagation on a user's finger, and the user pushed the right field.

[0019] In addition, as shown in drawing 3, the input device of this invention is supported with the spring 9. This spring is required in order to vibrate only the part of an input unit independently of the equipment carrying this input unit. When there is no location on the pushed touch panel 1 into the square field where said figure of 1, 2, ..., 0 was displayed, since it is an invalid field, CPU4 does not emit directions of vibration to the oscillating unit mechanical component 7. Since a user does not have the pushed reaction, he can know that it is an invalid field.

[0020] Next, actuation of the 2nd application is explained to a detail with reference to drawing. What was shown in drawing 5 is the example of the screen displayed on the input unit of this invention. It is being required that this screen should choose one of three sorts of processings, preservation of data, elimination of data, and elimination of all data, as a user. It pushes on this screen and only the inside of three fields of an oblong rectangle where the figure and directive of 1, 2, and 3** were displayed is effective.

[0021] "-- 1. -- this data is saved -- " -- short [in an oscillating unit] by the completely same approach as the 1st application, when the inside of a rectangle region is pushed -- time amount (for example, for 0.5 seconds) vibration is carried out.

[0022] "-- 2. -- this data is eliminated -- " -- when a rectangle region is pushed, since it cannot restore,

the data eliminated once vibrate a somewhat long time amount (for example, for 2 seconds) oscillating unit in order to warn. CPU4 of drawing 1 emits directions of vibration for 2 seconds to the oscillating unit mechanical component 7. After this vibration, although not illustrated, a screen is changed through the LCD display-control section 6, and [data are eliminated. Is it all right? "-- yes -- " -- "-- no -- " --] --

** -- saying -- the contents -- displaying -- making .

[0023] "-- 3. -- all data are eliminated -- " -- since when the inside of a rectangle region is pushed gives a user warning in order that a user may suffer serious damage if all data are eliminated accidentally, CPU4 of drawing 1 emits the oscillating directions by bigger vibration than before to the oscillating unit mechanical component 7. Although not illustrated, a screen is changed and all [data are eliminated. Is it all right although it becomes impossible to continue actuation of a system? "-- yes -- " -- "-- no -- " --] --

** -- saying -- the contents -- displaying -- making . Next, a user continues vibration until he does the depression of "yes" or no ["no"].

[0024] The oscillating unit mechanical component 7 can generate a bigger vibration by passing a big drive current by the oscillating unit 3. Vibration is not generated when it pushes except the three above-mentioned fields of an oblong rectangle.

[0025] Next, actuation of the 3rd application is explained to a detail with reference to drawing. It is the example of the display screen at the time of applying the input unit of this invention to a portable game machine which was shown in drawing 6 . The mission to which a user (player) destroys enemy troops' fort by the missile is in negative on this screen. 1, 2, 3, 4, 5, and 6 are enemy troops' forts in drawing 6 . Although a nuclear weapon, conventional arms, or food is hidden in the fort, there is also a camouflage fort without contents only in a form.

[0026] A player must destroy enemy troops' fort quickly in the game screen which changes every moment. An attack is delivered by touching the touch panel on a screen by the fingertip. When the fort in which conventional arms are hidden is touched, it is made to vibrate 3 times with BURUTSU, BURUTSU, and BURUTSU in the magnitude of vibration of whenever [middle], and a player is told about an offensive result. the case where the fort in which nuclear weapons are hidden is touched -- a brubru brubru bull, bull RURUNTSU !, and the beginning -- small -- the last -- it is made to vibrate greatly and big success in battle is told.

[0027] When what was touched is a provision store, vibration of the magnitude of whenever [middle] is short considered as BURURURU. When what was touched is a camouflage fort, it is made to vibrate as small [it is very short and] as BURUTSU. It is not made to vibrate when places other than a fort are touched. Thus, in this example, the amount of body sensory information to a change ***** player is increased for the oscillating pattern. Change of a pattern carries out, and as explained until now, time amount, the magnitude of vibration, intermittence of vibration, and continuous change of the magnitude of vibration are used for a way. The magnitude of vibration is controllable by the magnitude of the current supplied to an oscillating unit.

[0028] Since that vibration gets across to the whole game machine will raise the interest of a game rather when this invention is applied to a portable game machine, the supporting structure of an input unit with the spring shown in drawing 3 is not taken.

[0029] If the above is summarized, when a user does the depression of the touch panel, a touch panel will detect this and an oscillating unit will be vibrated. Vibration of an oscillating unit vibrates the whole input unit, and the vibration gets across to a user's finger. A user can know the reaction of an input in somesthesia, when vibration has got across to its finger. If the depression of the touch panel is carried out, only fixed time amount can also be vibrated, and only the pushed time amount can also be vibrated.

[0030] Moreover, if it can also be set as the magnitude which is extent which can set up the magnitude of vibration beforehand and vibration understands, it is also possible to set it as such a big vibration that a user surprised. While pushing, it is also possible to set up gradually so that the magnitude of vibration may be changed by the step of actuation if vibration can also be enlarged.

[0031] Moreover, when the mistaken carbon button is pushed, a setup is possible [when the contents of a display which the liquid crystal display under a touch panel shows are the icons of a manual operation button etc. and a right carbon button is pushed in a current actuation step, it is made to vibrate short,

and] so that it may be made to vibrate for a long time. By long vibration, an operator can know an operation mistake. In a right input of a key touch sound, this is short, in a post-input, is the analogy of a *****, and is an actuation interface intelligible for a user. When it is on a touch panel about actuation of hitting a partner when it applies to a game machine, it can make generating a big vibration etc. so that the interest of a game may be increased.

[0032] As mentioned above, although actuation of 1 operation gestalt of this invention has been explained in full detail with reference to a drawing, this invention is not restricted to this operation gestalt, and even if the design change of the range which does not deviate from the summary of this invention etc. occurs, it is contained in this invention.

[0033]

[Effect of the Invention] As explained until now, the 1st effectiveness by this invention is that a user can check a key touch also in the environment where it is hard to catch a key touch sound. The reason is because a touch panel front face vibrates at the time of a key touch and this can check a key touch in propagation somesthesia on a user's finger.

[0034] The 2nd effectiveness is that a user can check a key touch also in the hearing-impaired person who cannot catch a key touch sound. The reason is because a touch panel front face vibrates at the time of a key touch and this can check a key touch in propagation somesthesia on a user's finger.

[0035] The 3rd effectiveness is being able to perform use in the purpose which emits warning by the field which carried out the key touch. The reason is because oscillating patterns (magnitude of vibration, time amount, etc.) are alternatively changeable from detection of a touch location, and the comparison of the contents of a display.

[0036] The 4th effectiveness is increased from the case the interest of a game being based only on the contents of a display and the sound of a screen, when it applies to game devices, such as a portable game machine. The reason is because an effective oscillating pattern can be used with a touch location according to the contents of the game.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
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CLAIMS

[Claim(s)]

[Claim 1] A liquid crystal display unit (LCD) and the LCD display-control section which performs the display control of the alphabetic character displayed on this LCD, or a graphic form, The transparent touch panel which is arranged in the upper part of said LCD and can read the contents of a display of said LCD in the upper part, The touch panel detecting element which performs depression detection and depression location detection when predetermined depression actuation is performed on this touch panel, The oscillating unit which generates vibration and tells this vibration to a fingertip with directions of said touch panel detecting element, The touch-sensitive input unit which comes to provide CPU which performs control of the oscillating unit control section which performs drive control of this oscillating unit, said touch panel detecting element and said LCD display-control section, and said oscillating unit mechanical component.

[Claim 2] The time amount in which said oscillating unit generates vibration is a touch-sensitive input unit according to claim 1 characterized by enabling a setup to the time amount which is pushing said touch panel, or the arbitration time amount set up beforehand.

[Claim 3] Said oscillating unit control section is a touch-sensitive input unit according to claim 1 or 2 characterized by enabling a setup of vibration periods, the magnitude of vibration, or an oscillating pattern at arbitration corresponding to the depression situation of said touch panel.

[Claim 4] Said oscillating unit control section is a touch-sensitive input unit according to claim 1 to 3 characterized by enabling a setup of the existence of oscillating generating, the time amount of vibration, or the pattern of vibration to arbitration by whether the depression of the touch panel of which field of a display screen is carried out according to the contents of a display of said LCD.

[Translation done.]

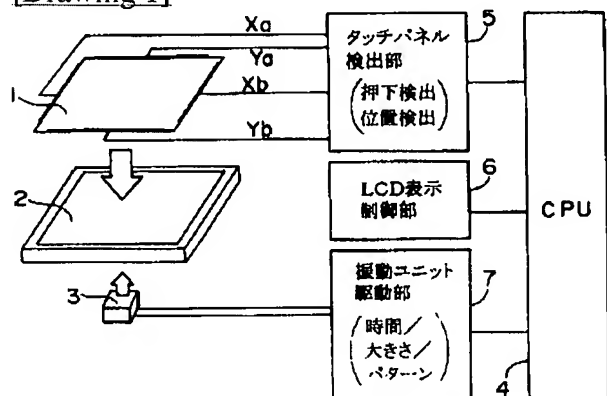
* NOTICES *

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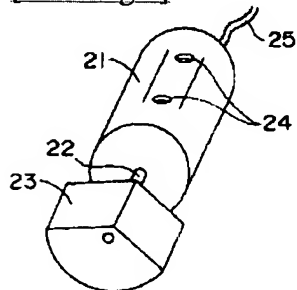
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- 2.*** shows the word which can not be translated.
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DRAWINGS

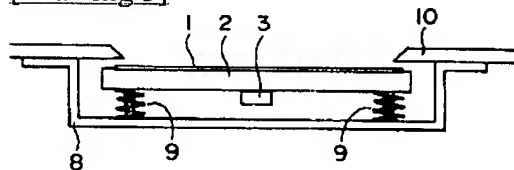
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Drawing 4]

暗証番号を入力して下さい

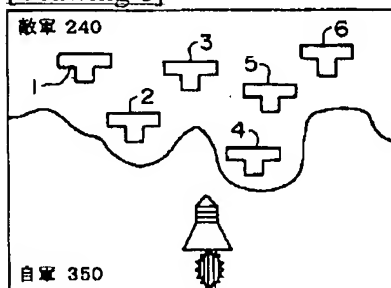
1	2	3
4	5	6
7	8	9
0		

[Drawing 5]

処理を選択して下さい

1. このデータを保存する
2. このデータを消去する
3. 全データを消去する

[Drawing 6]



[Translation done.]

Patent-Agency Cohen-CPLP (EXT-RES/Helsinki)

From: Patent-Agency Cohen-CPLP (EXT-RES/Helsinki) **Sent:** Fri 12/8/2006 5:51 PM
To: Patent-Agency Kawamorita (EXT-RES/Tokyo)
Cc:
Subject: RE: Koki Kawamorita/Alphonso A. Collins, PFE00C0001JP (4925-78PJP), OA Response, "Inquiry"
Attachments:

Thank. This confirms receipt of your letter. We are considering your analysis and will provide additional comments prior to the due date for responding.

Best regards,

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From: Patent-Agency Kawamorita (EXT-RES/Tokyo)
Sent: Fri 12/8/2006 3:42 AM
To: Patent-Agency Cohen-CPLP (EXT-RES/Helsinki)
Subject: Alphonso A. Collins/Koki Kawamorita, 4925-78PJP (PFE00C0001JP), OA Response, "Inquiry"

ATTORNEY-CLIENT COMMUNICATION-PRIVILEGED/CONFIDENTIAL

Dear Mr. A. Collins

Please see the attached letter and please confirm the matters of this letter by return e-mail.

Best regards,
 Koki Kawamorita

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Sent: 2006/11/22 (水) 7:09
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Subject: Koki Kawamorita/Alphonso A. Collins, X1K 1055 (4925-78PJP), OA Response, "OA dated 28.9.2006"

ATTORNEY-CLIENT COMMUNICATION-PRIVILEGED/CONFIDENTIAL

Dear Sirs,

PLEASE SEE THE ATTACHED DOCUMENT(S)!

Very truly yours,

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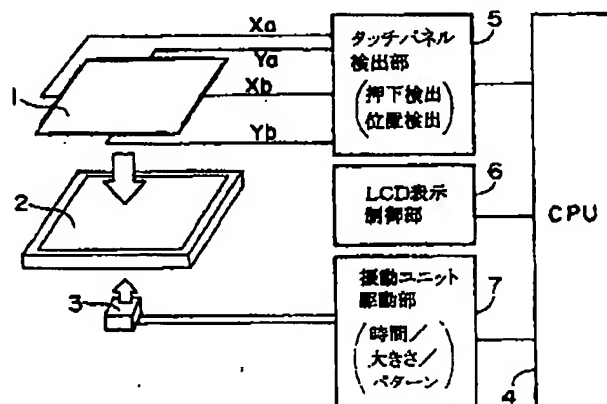
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Fターム (参考) 5B087 AA09 AB12 CC02 CC12 CC25
CC26
5G006 AA01 AA07 JA01 JA02 JB05

(54) 【発明の名称】 タッチパネル式入力装置

(57) 【要約】

【課題】 振動によりキータッチ確認を可能とするタッチパネル式入力装置の提供。また、タッチパネルを有する携帯用ゲーム機において表示画面と音以外のユーザインタフェースを提供する。

【解決手段】 液晶表示ユニット (LCD) と、このLCDに表示する文字または図形の表示制御を行うLCD表示制御部と、前記LCDの上部に配設され、前記LCDの表示内容を上方から読みとることができる透明なタッチパネルと、このタッチパネルに所定の押下操作が行われたとき押下検出および押下位置検出を行うタッチパネル検出部と、前記タッチパネル検出部の指示によって振動を発生して指先にこの振動を伝える振動ユニットと、この振動ユニットの駆動制御を行う振動ユニット制御部と、前記タッチパネル検出部、前記LCD表示制御部および前記振動ユニット駆動部の制御を行うCPUとを具備することを特徴とする。



【特許請求の範囲】

【請求項1】 液晶表示ユニット（LCD）と、

このLCDに表示する文字または図形の表示制御を行うLCD表示制御部と、

前記LCDの上部に配設され、前記LCDの表示内容を上方から読みとることができる透明なタッチパネルと、このタッチパネルに所定の押下操作が行われたとき押下検出および押下位置検出を行うタッチパネル検出部と、前記タッチパネル検出部の指示によって振動を発生して指先にこの振動を伝える振動ユニットと、

この振動ユニットの駆動制御を行う振動ユニット制御部と、

前記タッチパネル検出部、前記LCD表示制御部および前記振動ユニット駆動部の制御を行うCPUとを具備してなるタッチパネル式入力装置。

【請求項2】 前記振動ユニットが振動を発生する時間は、

前記タッチパネルを押下している時間、または予め設定した任意時間に設定可能としたことを特徴とする請求項1に記載のタッチパネル式入力装置。

【請求項3】 前記振動ユニット制御部は、振動時間、振動の大きさ、または振動パターンを前記タッチパネルの押下状況に対応して任意に設定可能としたことを特徴とする請求項1または2に記載のタッチパネル式入力装置。

【請求項4】 前記振動ユニット制御部は、前記LCDの表示内容によって表示画面のどの領域のタッチパネルを押下するかにより、振動発生の有無、振動の時間、または振動のパターンを任意に設定可能としたことを特徴とする請求項1ないし3のいずれかに記載のタッチパネル式入力装置。

【発明の詳細な説明】**【0001】**

【発明の属する技術分野】 本発明は、液晶表示装置を備えたタッチパネル式入力装置に関し、特に入力操作により入力装置自体が振動を発生する機能に関する。

【0002】

【従来の技術】 従来、タッチパネル付きの液晶表示装置を備えたATM（現金自動支払預け入れ装置）、ファクシミリなどのOA装置、工場で使用されるFA設備などにおいて、タッチパネルに触れて入力操作を行うと、利用者にキー入力されたことを確認させるためのビツというキータッチ音が出るものが実用化されている。キー入力を確認させる手段としては、キー入力により液晶表示装置画面の表示内容を変化させるなどの方法もあるが、直感的にはキータッチ音という聴覚に訴える手段が有効である。

【0003】

【発明が解決しようとする課題】 しかしながら、上述の

困の騒音によりキータッチ音が聞き取りにくく、操作の差し障りになるという課題があった。また、タッチパネルを持たない携帯電話機において、テンキー等の押下時に携帯電話が有する着信表示用振動機（バイブレータ）を振動させて操作者に振動を伝えるものは特開平10-13507号に掲載されているが、タッチパネル式入力装置において、入力によって振動を発生するものは存在しなかった。

【0004】 また、家庭用テレビゲーム機などにおいて、本体からケーブルで接続されたゲーム操作コントローラを振動させるものは既に商品化されているが、携帯用ゲーム機においては、タッチパネル付き液晶表示装置を備えたものは存在せず、操作は、もっぱら独立した操作ボタン、十字ボタンなどによっている。ゲームの興味を増すため、携帯用ゲーム機においても操作をタッチパネルで行い、かつタッチパネル入力によりゲーム機自体が振動する機能の実現が課題となっていた。

【0005】 本発明はこのような背景の下になされたもので、キータッチによって振動を発生するタッチパネルの入力確認手段を提供することに加え、この入力確認手段によって、入力有効領域かどうかを利用者に知らせたり、データの消去などの後戻り不可能な操作実行の確認などのユーザーインタフェースの向上と、ゲーム機等に利用した場合の新しい操作感覚のタッチパネル式入力装置を提供することを目的とする。

【0006】

【課題を解決するための手段】 請求項1に記載の発明は、液晶表示ユニット（LCD）と、このLCDに表示する文字または図形の表示制御を行うLCD表示制御部と、前記LCDの上部に配設され、前記LCDの表示内容を上方から読みとることができる透明なタッチパネルと、このタッチパネルに所定の押下操作が行われたとき押下検出および押下位置検出を行うタッチパネル検出部と、前記タッチパネル検出部の指示によって振動を発生して指先にこの振動を伝える振動ユニットと、この振動ユニットの駆動制御を行う振動ユニット制御部と、前記タッチパネル検出部、前記LCD表示制御部および前記振動ユニット駆動部の制御を行うCPUと具備してなるタッチパネル式入力装置を提供する。

【0007】 請求項2に記載の発明は、前記振動ユニットが振動を発生する時間が、前記タッチパネルを押下している時間、または予め設定した任意時間に設定可能としたことを特徴とする請求項1に記載のタッチパネル式入力装置を提供する。

【0008】 請求項3に記載の発明は、前記振動ユニット制御部が、振動時間、振動の大きさ、または振動パターンを前記タッチパネルの押下状況に対応して任意に設定可能としたことを特徴とする請求項1または2に記載のタッチパネル式入力装置を提供する。

ユニット制御部が、前記LCDの表示内容によって表示画面のどの領域のタッチパネルを押下するかにより、振動発生の有無、振動の時間、または振動のパターンを任意に設定可能としたことを特徴とする請求項1ないし3のいずれかに記載のタッチパネル式入力装置を提供する。

【0010】上述した課題を解決するため、本発明のタッチパネル式入力装置では、液晶表示装置をその下面に備えるとともに、振動発生用の振動ユニットを備える。振動ユニットの振動の大きさおよび振動のパターンは、予め設定可能であり、またタッチパネルを押下した時間に連動して設定も可能である。またタッチパネル下面の液晶表示装置が表示している表示内容により、表示画面のどの領域上のタッチパネルを押下するかにより、振動発生の有無、振動の時間、振動のパターンを任意に設定できる。

【0011】

【発明の実施の形態】次に、本発明の実施の形態について図面を参照して詳細に説明する。図1は、本発明の一実施形態によるタッチパネル式入力装置の構成を示す図である。図1によって構成要素を説明する。符号1は、タッチパネルであり、ここでは抵抗膜式アナログタッチパネルを使用するが、タッチパネルの方式自体は何であってもよい。デジタル式のものでもよい。

【0012】2は、液晶表示ユニット(LCD)であり、このLCD2の表示内容は透明な前記タッチパネル1を通して上方から読みとることができる。3は、振動ユニットであり、その構造は後述する。5は、タッチパネル検出部で、タッチパネルの押下検出および押下位置検出を行う。6は、LCD表示制御部であり、前記LCD2に表示する文字、図形の表示制御を行う。7は、振動ユニット駆動部であり、前記振動ユニット3の駆動制御を行う。振動時間、振動の大きさ、振動パターンを制御する。

【0013】4は、中央処理装置(CPU)であり、前記タッチパネル検出部5、前記LCD表示制御部6、前記振動ユニット駆動部7、および図示されていない本入力装置を搭載した装置の他の部分とを結合した全体制御を行う。タッチパネル1とLCD2と振動ユニット3とは、図1では説明のため分離して描かれているが、実際には図3で示すように、LCD2を挟んで互いに密着して構成される。

【0014】図2は、本発明に使用する振動ユニットの構造を示す図である。この図における構成要素を説明する。符号21はモータ、22はモータの回転軸、23は軸に非対称な形状をした錘、24は取り付け用ネジ穴、25はモータ21に駆動電流を供給するためのリード線である。モータ21を回転させると錘23が回転軸22に対して非対称のため、振動が発生する。駆動電流を大

【0015】図3は、本発明の一実施形態の断面図である。図3における構成要素を説明する。符号1は、前述したタッチパネル、2は前述したLCD、3は前述した振動ユニットである。符号8はこの実施形態の入力装置を支持するためのフレームである。このフレームは金属である必要はない。9はバネであり、本実施形態ではLCD2の下面四隅に全部で4本使用する。このバネは、この入力装置を搭載した装置から独立して入力装置の部分だけを振動させるために必要である。ただし、携帯用ゲーム機に应用した場合は、入力装置のタッチパネル面以外にゲーム機本体が振動してもかまわないので、このバネを省略することができる。符号10は化粧版である。

【0016】次に、本発明の一実施形態の第1の応用例の動作について、図を参照して詳細に説明する。図4に示したのは、本発明の入力装置上に表示した画面の例である。この画面は利用者に暗証番号の入力を要求している。この画面上で押して有効なのは、画面上の1、2、・・・、0の数字の表示された四角い領域内のみである。

【0017】図1において、利用者がタッチパネル1の表面を押すと、タッチパネル検出部5は、タッチパネルに押下入力があったこと、および押下されたタッチパネル上の位置(X、Y座標上の位置)を検出する。検出方法については既知の技術のため説明を省略する。タッチパネル検出部5は、中央処理装置(CPU)4に検出した情報を知らせる。CPU4では、CPU4がLCD表示制御部6を通じてLCD2に表示している文字・図形の位置(X、Y座標上の位置、これはタッチパネル1上の位置と等しい)と、タッチパネル検出部5から通知された位置を比較する。比較した結果、押下されたタッチパネル1上の位置が前記1、2、・・・、0の数字の表示された四角い領域内にあれば振動ユニット駆動部7に対して振動ユニット3を振動させるよう指示を発する。

【0018】有効な領域が押下された場合、短い時間(例えば0.5秒間)振動させるように指示を出す。振動ユニット駆動部7は、振動ユニット3に対して0.5秒の間駆動電流を流す振動ユニット3は図2に示す構造になっており、図2においてリード線25から駆動電流を供給すると、モータ21の回転軸22が回転する。錘23が回転軸22に対して非対称のため、振動が発生する。モータ21は、取り付け用ネジ穴を用い、図1のLCD2の下面にネジでしっかりと固定されているため、振動はLCD2を通して、タッチパネル1の表面に伝わる。利用者の指はタッチパネル1の表面に触れているので、この振動は利用者の指に伝わり、利用者は正しい領域を押下したことを知ることができる。

【0019】なお、図3に示すように、本発明の入力装置はバネ9により支持されている。このバネは、この入

けを振動させるために必要である。押下されたタッチパネル1上の位置が前記1、2、・・・、0の数字の表示された四角い領域内にない場合は、無効領域なのでCPU4は振動の指示を振動ユニット駆動部7に発しない。利用者は、押下した反応がないため、無効領域であることを知ることができる。

【0020】次に、第2の応用例の動作について、図を参照して詳細に説明する。図5に示したのは、本発明の入力装置上に表示した画面の例である。この画面は利用者に、データの保存、データの消去、全データの消去の3種の処理のうち、1つを選択することを要求している。この画面上で押して有効なのは、1、2、3、の数字と指示文が表示された3つの横長の長方形の領域のみである。

【0021】「1. このデータを保存する」の長方形領域内を押下した場合は、第1の応用例と全く同様の方法で振動ユニットを短い時間（例えば0.5秒間）振動させる。

【0022】「2. このデータを消去する」の長方形領域内を押下した場合は、一度消去したデータは復元できないため、警告をする目的で少し長い時間（例えば2秒間）振動ユニットを振動させる。図1のCPU4は、振動ユニット駆動部7に対して2秒間振動の指示を発する。この振動後、図示しないが、画面をLCD表示制御部6を通して切り替え、[データを消去します。よろしいですか。「はい」「いいえ」]という内容を表示させる。

【0023】「3. 全データを消去する」の長方形領域内を押下した場合は、もし全データを誤って消去すると、利用者が重大な被害を被るため、利用者に警告を与えるため、図1のCPU4は振動ユニット駆動部7に対して、これまでより大きな振動での振動指示を発する。図示しないが、画面を切り替え、[全データを消去します。システムの動作が続行できなくなりますがよろしいですか。「はい」「いいえ」]という内容を表示させる。次に利用者が「はい」「いいえ」のいずれかを押下するまで振動を続けさせる。

【0024】振動ユニット駆動部7は、振動ユニット3により大きな駆動電流を流すことでより大きな振動を発生させることができる。上記3つの横長の長方形の領域以外を押下した場合には、振動は発生させない。

【0025】次に、第3の応用例の動作について、図を参照して詳細に説明する。図6に示したのは、本発明の入力装置を携帯用ゲーム機に適用した場合の表示画面例である。この画面で利用者（プレーヤ）は、ミサイルで敵軍の要塞を破壊する使命を負っている。図6で1、2、3、4、5、6が敵軍の要塞である。要塞には、核兵器、通常兵器、食料のいずれかが隠されているが、形

の中で、すばやく敵軍の要塞を破壊しなければならない。攻撃は、指先で画面上のタッチパネルに触れることにより行う。通常兵器の隠されている要塞にタッチした場合は、中程度の振動の大きさをブルッ、ブルッ、ブルッと3回振動させて攻撃の成果をプレーヤに知らせる。核兵器の隠されている要塞にタッチした場合は、ブルブルブルブル、ブルルンッ!と最初小さく、最後大きく振動させて大きな戦果を知らせる。

【0027】タッチしたのが食料庫だった場合は、短くブルルルと中程度の大きさの振動をさせる。タッチしたのが偽装要塞だった場合は、ごく短くブルッと小さく振動させる。要塞以外のところにタッチした場合は振動させない。このように本例では振動パターンを変化させてプレーヤへの体感情報量を増やしている。パターンの変化のさせ方は、これまで説明したように時間、振動の大きさ、振動の断続、振動の大きさの連続的变化を用いる。振動の大きさは、振動ユニットに供給する電流の大きさにより制御することができる。

【0028】本発明を携帯用ゲーム機に適用した場合は、振動がゲーム機全体に伝わることはむしろゲームの興味を高めることになるので、図3に示したバネによる入力装置の支持構造はとらない。

【0029】以上を総括すると、利用者がタッチパネルを押下することにより、タッチパネルがこれを検知し、振動ユニットを振動させる。振動ユニットの振動は入力装置全体を振動させ利用者の指にその振動が伝わる。利用者は、自分の指に振動が伝わってきたことにより、入力反応を体感的に知ることができる。タッチパネルを押下すると一定時間だけ振動させることもでき、押下している時間だけ振動させることもできる。

【0030】また、振動の大きさは予め設定可能で、振動がわかる程度の大きさに設定することもできれば、利用者を驚かすほど大きな振動に設定することも可能である。押している間、段々に振動を大きくすることもできれば、操作のステップにより振動の大きさを変えるように設定することも可能である。

【0031】また、タッチパネル下面の液晶表示装置が表示している表示内容が、例えば操作ボタンのアイコンなどであった場合、現在の操作ステップにおいて正しいボタンを押した場合には短く振動させ、誤ったボタンを押した場合には長く振動させるように設定ができる。長い振動によって、操作者は誤操作を知ることができる。これはキータッチ音が、正しい入力の場合は短く、後入力の場合には長いことのアナロジーであり、利用者にわかりやすい操作インタフェースである。ゲーム機に適用した場合は、相手に命中する操作をタッチパネル上で行った場合に大きな振動を発生させるなど、ゲームの興味を増すように作ることができる。

れるものではなく、本発明の要旨を逸脱しない範囲の設計変更等があっても本発明に含まれる。

【0033】

【発明の効果】これまでに説明したように、この発明による第1の効果は、キータッチ音を聞き取りにくい環境においても、キータッチを利用者が確認できることである。その理由は、キータッチ時にタッチパネル表面が振動し、これが利用者の指に伝わり体感的にキータッチを確認できるためである。

【0034】第2の効果は、キータッチ音を聞き取ることができない聴覚障害者においても、キータッチを利用者が確認できることである。その理由は、キータッチ時にタッチパネル表面が振動し、これが利用者の指に伝わり体感的にキータッチを確認できるためである。

【0035】第3の効果は、キータッチした領域により警告を発する目的などでの使用ができることである。その理由は、タッチ位置の検出と表示内容の比較から、選択的に振動パターン（振動の大きさ、時間など）を変えることができるためである。

【0036】第4の効果は、携帯用ゲーム機等のゲーム機器に適用した場合、ゲームの興味が画面の表示内容と音だけによる場合より増進することである。その理由は、ゲームの内容に応じてタッチ位置により効果的な振動パターンを用いることができるためである。

【図面の簡単な説明】

【図1】 本発明の一実施形態によるタッチパネル式入

力装置の構成を示す図である。

【図2】 図1の実施形態の振動ユニットの構造を示す図である。

【図3】 図1の実施形態の断面図である。

【図4】 本発明の一実施形態の入力装置による第1の応用例の表示画面の例を示す図である

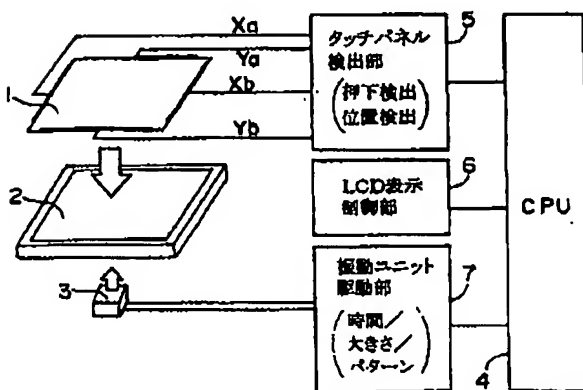
【図5】 本発明の一実施形態の入力装置による第2の応用例の表示画面の例を示す図である

【図6】 本発明の一実施形態の入力装置による第3の応用例の表示画面の例を示す図である

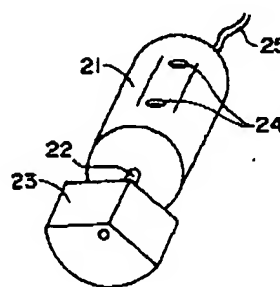
【符号の説明】

- 1…タッチパネル
- 2…液晶表示ユニット（LCD）
- 3…振動ユニット
- 4…中央処理装置（CPU）
- 5…タッチパネル検出部
- 6…LCD表示制御部
- 7…振動ユニット駆動部
- 8…フレーム
- 9…バネ
- 10…化粧板
- 21…モータ
- 22…回転軸
- 23…錘
- 24…取り付け用ネジ穴
- 25…リード線

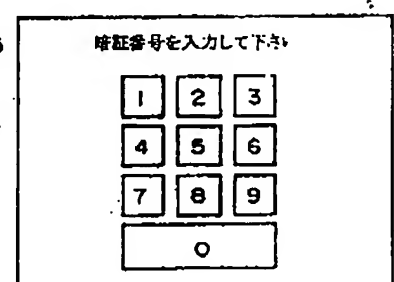
【図1】



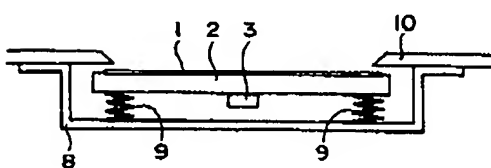
【図2】



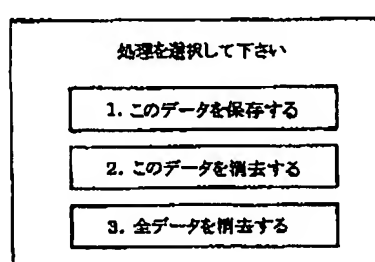
【図4】



【図3】



【図5】



【図6】

